

MEMORANDUM

To: Stephen Spencer
Department of the Interior

From: Rick Newill
Consultant to the Department of the Interior

CC: William Lodder
Department of the Interior

Date: March 1, 2011

Subject: Observations and Recommendations Regarding Jackpile Mine Expanded Site
Inspection Conceptual Site Model

Per your request, this memorandum provides my observations and recommendations based on my review of the Jackpile Mine Expanded Site Inspection Conceptual Site Model, dated February 2011, by Weston Solutions, Inc. and related documents and information. Further, I have discussed these observations and recommendations with Scott Anderholm of the USGS and I understand we are in general agreement.

The Expanded Site Inspection (ESI) conceptual site model (CSM) report appears to do a good job of distilling information from earlier studies and provides some interesting insights based on the existing incomplete and dated data set. In my opinion, it over-reaches in concluding the mine is the predominant source of uranium in surface water at and down stream of the mine. The following are concerns I have with the conclusions drawn in the report:

- The report presents a conceptual theory of back a forth flushing of water between the creeks and backfilled pits driven by evapotranspiration that is speculative and based on very little data.
- Other than this speculative source of water, it is difficult to explain a source of water to the pits other than inflowing groundwater. The elevation relationships between the surface water and pit water are not well demonstrated or understood, and the proposed theory of evapotranspiration as the factor driving this speculative long distance flushing is questionable in my view. There is not a clear picture on which to demonstrate a pathway for pit water to affect surface water.
- The quality of backfilled pit water, the supposed source of the contamination, is not well understood. The existing data are dated and have questionable quality. There apparently are little or no oxidation-reduction potential data for the buried pits. A current source of mine impacted pit water has not been demonstrated.



- Other reasonable potential sources for uranium in surface water may exist, including evaporative concentration, as speculated by Scott Anderholm. The observation in the CSM report of evaporative concentration of uranium in salts deposited in the streambeds lends credence to this possibility.

Based on my cursory review of the reports and Weston's presentation at the site two weeks ago, it is my opinion that the existing state of knowledge is not sufficient to draw strong conclusions one way or the other as to the degree to which the mine has influenced uranium concentrations in surface water, or the degree of risk posed by current conditions at the site. Therefore, I think the reasonable conclusion at this point is that the mine may contribute to uranium in surface water, but other sources may also contribute. I would prefer to see the CSM report acknowledge this uncertainty.

With respect to additional investigation under the ESI, I generally concur with the recommendations in the report and with Scott Anderholm's recommendations; namely:

- Obtaining a reliable engineering surveying data set for all groundwater, surface water and sediment monitoring locations. Coupled with this should be an inventory of the condition of existing monitoring wells and their current suitability for use in monitoring groundwater.
- Obtaining complete and consistent seasonal data sets for groundwater and surface water elevations and stream discharge rates in order to better resolve the hydrological relationships between surface water, groundwater, and backfilled pit water.
- Conducting the "seepage run" proposed by Scott Anderholm to measure discharge rates and water quality along the streams.
- Collecting a consistent and complete set of water quality data for surface water, groundwater and backfilled pit water to establish a current baseline condition on which to evaluate current conditions and potential risk. This may also include installation of one or more backfilled pit water wells unless existing wells are available to characterize pit water quality, including radionuclide concentrations and oxidation-reduction potential. This is key if a determination is to be made that contaminated pit water is the source of uranium in surface water.

I would be happy to discuss this further with you at your convenience.

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